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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/085,753	02/28/2002	Toshihito Tsuga	TI-31620	8409
23494	7590	06/18/2004		
TEXAS INSTRUMENTS INCORPORATED				
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			EXAMINER	
			KORNAKOV, MICHAEL	
			ART UNIT	PAPER NUMBER

1746

DATE MAILED: 06/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.	Applicant(s)	
10/085,753	TSUGA ET AL.	
Examiner	Art Unit	
Michael Kornakov	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5, 8 and 9 is/are pending in the application.
- 4a) Of the above claim(s) 9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5 and 8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-3, 5, 8 and 9 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
- 1) ☒ Certified copies of the priority documents have been received.
- 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
- 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/07/2004 has been entered.

2. Claims 1, 3, 5, 8 and 9 are pending in the Application. Claim 9 is withdrawn from consideration. Claims 1-3, 5 and 8 are examined on the merits.

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-3, 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuno, Pregrant Publication (US 2001/0009155).

Matsuno discloses a method for removal fine particles from semiconductor wafers, by treating the said substrate with ozone water, which has been prepared by dissolving an ozone containing gas in ultra-pure water (reads on the "first cleaning process", as instantly claimed); and treating the said substrate with hydrogen water, which has been prepared by dissolving a hydrogen containing gas in ultra-pure water (reads on the "second cleaning process", as instantly claimed), wherein the treatment with hydrogen water is enhanced by applying ultrasonic waves (page 12, claim 1; page 4, paragraph 0046). Matsuno teaches the preferable concentration of ozone in ozone

**water as being 10 ppm** (reads on the limitations of claim 5). Matsuno also teaches treating the substrate with HF-containing water (reads on the "fourth cleaning process", as instantly recited in claim 3) after the step in which the substrate is treated with said ozone water, said hydrogen water. Matsuno specifically indicates that his cleaning method can be realized utilizing soaking treatments of substrate in ozone water and hydrogen water (page 10, paragraph 0087) and, therefore, the steps of immersing substrate in respective cleaning solutions, contained in respective cleaning tanks are inherent in Matsuno's teaching.

The disclosure of Matsuno differs from the instant claim 1 by indicating the **preferable** concentration of hydrogen at 0.5 ppm versus the range of 0.3-0.4 ppm, as instantly claimed. However, Matsuno also teaches the use of hydrogen concentrations lower than 0.5 ppm, which **in some instances** may not provide the optimum results, because it may require too much time for the sufficient removal of resist pieces (page 3, paragraph 0042). Thus, Matsuno clearly indicates the possibility of utilizing the lower hydrogen concentrations depending on actual processing conditions. Therefore, one skilled in the art, having a certain semiconductor wafer cleaning task and motivated by the indication of Matsuno would have found obvious to experiment with different concentrations of hydrogen in a second cleaning solution, and try the concentrations lower than 0.5 ppm, wherein the concentrations of 0.3 ppm and 0.4 ppm are clearly envisaged, therefore decreasing the concentration of hydrogen in the processing solution in order to minimize formation of gas bubbles in the processing solution and

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thus to increase the efficiency of wafer cleaning with the reasonable expectation of success.

It is also noted here that disclosed preferred embodiments do not constitute a teaching away from a **broader disclosure or non-preferred embodiments**. *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, **including non-preferred embodiments**. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir.1998.)

With regard to claim 2, Matsuno does not specifically indicate the step of cleaning substrate with ultra-pure water after treating the substrate with ozone water. However, Matsuno provides clear motivation to implement such steps by stating that after cleaning the substrate is rinsed with ultra-pure water **as needed** (page 4, paragraph 0050). Therefore, one skilled in the art, motivated by Matsuno's statement, would have found obvious to rinse semiconductor substrate with ultra-pure water after treatment the wafer with ozone water in order to prevent excessive formation of oxides and diminish re-deposition of fine particles on wafer surfaces in Matsuno's method.

With regard to claim 8, Matsuno teaches soaking treatments of substrate in ozone water and hydrogen water as instantly claimed, but remains silent about 3-20 minutes of treatment time. It is noticed here, that durations of substrate treatment in ozone water and in hydrogen water are result effective parameters, because they affect

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the level of removal of respective fine particles and therefore the cleanness of substrate surfaces. However, discovery of optimum value of result effective variables in known process is ordinarily within the skill in the art and would have been obvious, consult *In re* Boesch and Slaney 205 USPQ 215 (CCPA 1980).

### ***Response to Arguments***

4. Applicant's arguments filed 05/14/2004 have been fully considered but they are not persuasive.

While admitting that 0.5 ppm concentration of hydrogen might be a preferred embodiment, Applicants argue that Matsuno patent specifically teaches away from using concentrations below 0.5 ppm and that the examiner has failed to consider this specific teaching away in forming the rejection on 3/5/04. In reply, Applicants' attention is drawn to paragraph 3 of the instant office action, wherein the issues, raised by Applicants, are discussed in details. It is the examiner's position, that the non-preferred embodiment of Matsuno fairly suggests the limitations as instantly claimed.

Applicants also argue, that one would not expect the range below 0.5 ppm to have the same properties as that above 0.5 ppm and that the Matsuno patent teaches that the properties in these ranges are different. In reply, it is noted here, that the only difference in properties indicated by Matsuno is processing time, which only in **some instances** may be different, if the substrate is treated with solution having lower hydrogen concentration. This clearly corresponds with Table 3 of Applicants' disclosure, which represents particle removal rate depending on hydrogen

concentration and wherein the said rate is significantly lower than the rate obtained while treating the substrate with the solution, having concentrations of hydrogen 0.5 ppm or higher.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*M. Kornakov*

Michael Kornakov  
Primary Examiner  
Art Unit 1746

06/16/2004